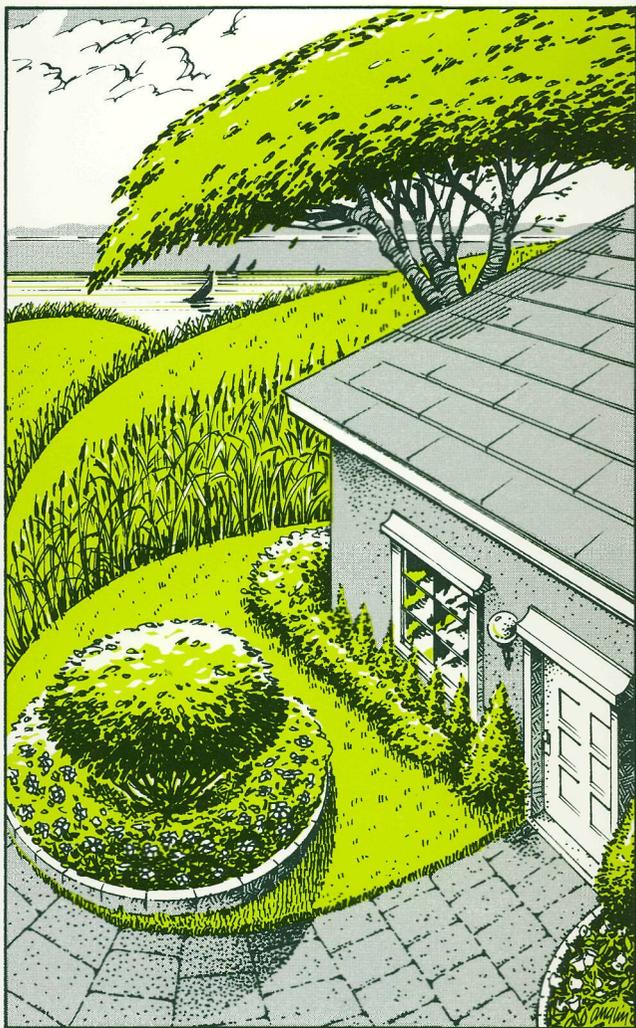

GALVESTON BAY

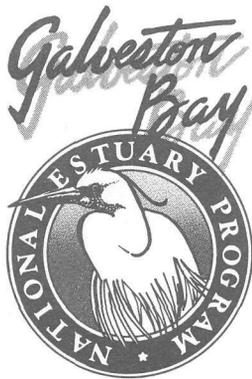
AREA RESIDENTS'



HANDBOOK

GALVESTON BAY
AREA RESIDENTS'

H A N D B O O K



Published by the Galveston Bay National Estuary Program

in cooperation with

United States Environmental Protection Agency Region 6 • Texas Department
of Health • Texas General Land Office • Texas Parks and Wildlife Department
• Texas Water Commission • Brazoria, Chambers, Galveston, Harris and
Liberty Counties

This project has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement #CE-006550-01 to the Texas Water Commission. The contents of this document do not necessarily represent the views of the United States Environmental Protection Agency, nor does mention of trade names or commercial products constitute an endorsement or recommendation for use.

TABLE OF CONTENTS

	Page
Introduction to Galveston Bay	1
Nonpoint Source Pollution	5
Individual Action for the Bay	13
Lawn Care	15
Fertilizers	15
Pesticides	16
Sediments	17
Native Plants	18
Waterfront Property	24
Hazardous Household Products & Wastes	25
Hazardous Products	25
Septic Tanks	31
Automobile Care	32
Boat Care	33
Contact Numbers	35
Public Opinion Survey	39

Figures

Map of the Galveston Bay System	3
Household Hazardous Wastes Disposal Chart	29

INTRODUCTION TO GALVESTON BAY

If you live in the Greater Houston Area, you have an impact on Galveston Bay. Even if you do not live, fish, sail or work on the Bay, you have an impact on it. You and seven million other Texans from Dallas to the Bayshore communities live in the Galveston Bay watershed - what goes down your drain and washes off your yard directly affects the Bay.

The fresh water from the Trinity River, the San Jacinto River, and many other streams and bayous mix with the salt water of the Gulf of Mexico in Galveston Bay. The Bay's shallow depth and brackish water create the rich habitat necessary for a marine nursery. This environment is called an estuary.

Upstream human settlement during the last hundred years has caused many changes in the Galveston Bay system. When John James Audubon traveled through the region, he described areas teeming with life and rich in production of fish and shellfish. Accounts of cattle being driven across oyster reefs in the central Bay were not uncommon. Sea grasses were prevalent throughout the Bay.

The Bay is still very productive in spite of the change in and loss of habitat for marine life. An increasing amount of nutrients and toxic discharges into the Bay from a variety of sources are also taking their toll on marine habitat.

As population centers enlarge and move closer to the Bay, new threats to the environmental health of the estuary are created. It is estimated that by the year 2000, nearly 60% of all Americans will live within fifty miles of a coast. To date, over half of Texas' population lives within the Galveston Bay watershed. In fact, over 60% of all Texas' permitted discharged waste water eventually reaches Galveston Bay. Although major oil spills like those from the *Apex*, *Valdez* and

Mega Borg are spectacular and devastating, far less spectacular, but far more devastating, are the cumulative effects of every-day events like rainfall runoff, sewage plant bypasses, leaking barges, careless cargo loading and unloading and shoreline development.

Despite all this, Galveston Bay, the largest estuary in Texas and the seventh largest in the country, remains productive. It produces 70% of the oyster landings and 45% of the recreational fish catches in Texas. Shrimping and recreational boating are also vital industries.

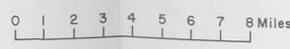
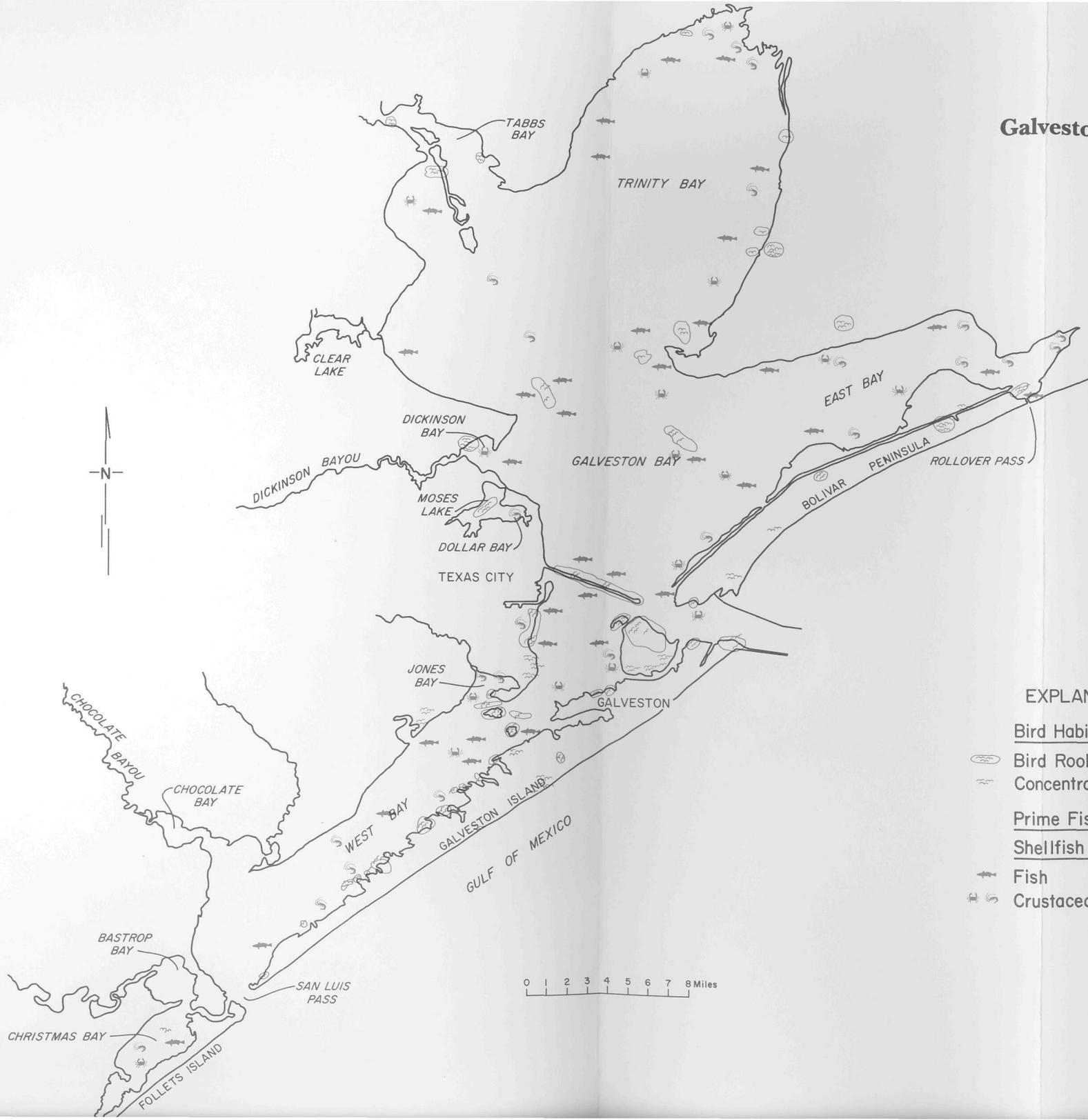
Galveston Bay is surrounded by commercial and industrial activities. More than 4,700 ships cross the Bay yearly on their way to the Port of Houston—the third largest port in the country. Nearly fifty percent of all petrochemicals produced in the United States are manufactured along the shores of Galveston Bay. In addition to refinery jobs and products, Galveston Bay accounts for nearly three billion dollars in direct and indirect economic benefits each year.

Ironically, the very things bringing people to the Bay are currently raising concerns for this vital resource. As the urbanization from the fourth largest city in the United States moves closer to the Bay, water quality degrades, sea grasses and wetlands disappear, and pressures to over-harvest fishes, shrimp and oysters increase.

But of course, the health of the Bay is at least partly under our control. We can keep the Bay at its current productive level and can even enhance its productive qualities. But it will take all of us working together and thinking of the Bay as an ecosystem. Individual actions are important.

By joining the others who work with the Galveston Bay National Estuary Program, you can make the difference to keep the Bay a healthy natural and commercial resource.

Galveston Bay Map



EXPLANATION

- Bird Habitats
-  Bird Rookeries
-  Concentrations of Birds
- Prime Fish and Shellfish Grounds
-  Fish
-  Crustaceans

NONPOINT

SOURCE POLLUTION



The sun breaks through the clouds as a rainy day turns to a beautiful spring afternoon. The outside air has a fresh clean smell. Acting as a cleanser, the rain has washed away built-up pollution and contamination. Road sludge, fertilizers, pesticides, trash and other discards were carried away in the rain water run-off, never to be seen again. At least that's what we would like to think.

But we know it is not true. The runoff after a rain carries *nonpoint source pollution*, the residue of everyday human activity. We are all familiar with single point sources of pollution. Point source pollution is that which comes out of a pipe, or from a single discharge into a water body, such as a sewage line. Point source and nonpoint source pollution both have major impacts on the water quality of Galveston Bay. However, the overall impact of nonpoint source pollution is especially difficult to quantify because the sources are so scattered.

A water quality expert was once caught in a rainstorm while measuring the amount of oxygen in the water flowing into Galveston Bay. As he continued his testing, the oxygen-demanding pollutants carried with the rainfall runoff used up the oxygen in the water and many of the fish began to die before his eyes. The oxygen in water is a vital component for life of plants, fish, and microscopic organisms. Many of the fish kills investigated by biologists have been caused by nonpoint source pollution.

We could cure nonpoint source pollution by collecting all rain water runoff for treatment, just as we now do for sewage. This would involve a total rebuilding of the storm water system, which was designed to get a large quantity of (very polluted) water to the bayou or Bay quickly.

If that sounds like a nearly impossible task, it would be. It would also be very expensive. Estimates to restructure the storm sewer system of the City of Houston for water treatment are as high as \$15,000,000,000. This fifteen billion dollar estimate does not even include treatment of the collected water or acquisition of the lands required for the water treatment.

If it could be done, the next question would be, "Is it worth it?". To answer this question, you must consider the issues involved. We all want the environment to be healthy and well protected—but are there less expensive solutions? The answer is yes. It's possible to reduce nonpoint source pollution for less than \$15 billion, but not unless those who live and work within the Bay watershed cooperate. This approach would stop pollution before it gets into the system, by reduction of oil wastes, fertilizers, pesticides, and other poisons that now go down the storm sewer on your street.

This handbook will explain some of the key causes of nonpoint source pollution. Some you can address today. You will find many of the solutions offered involve only simple changes in everyday activity. Pollution prevention is truly an area where one person can make a difference.

Rainfall Runoff

Urban rainfall runoff is highly contaminated. And, it is one of the greatest challenges in an area like Houston-Galveston because of the more than fifty-two inches of rain we receive each year. Remember a fresh rain smell indicates that a new load of contaminants has just washed into Galveston Bay.

There are many ways to help prevent highly contaminated runoff after rain storms. For example, make sure your car does not leak fluids, and if an accidental spill of auto fluids occurs, clean it up to the best of your ability. Some other steps are given in the automotive section of this handbook.

Oil in Storm Sewers

A study in the Chesapeake Bay area showed that up to 4.5 million gallons of oil run off the streets of Washington D.C. into Chesapeake Bay each year. That's up to half the amount of oil spilled by the *Exxon Valdez* every year! Consider the oil contributed by metropolitan Houston, an

even larger metropolitan area with some 3.5 million residents.

Think of the times you have seen people pour their oil down the storm sewer in front of their house. It's easy, and it's gone quickly. But with the first rain, that four quarts of oil can cause an oil sheen on water as big as eight football fields. That is just the oil from one car.

Fertilizers on the Yard

To most of us, fertilizers mean a lush, beautiful lawn. But if applied in excess, fertilizer can wash into the storm sewers, and from there to bayous and the Bay itself. Fertilizer stimulates plant growth in the water just like on land. In this case the plants are microscopic algae and the result is called a "bloom". If you play golf, and notice a water hazard filled with green scum, chances are you have seen the outcome of a fertilizer-induced algal bloom.

The rapid growth of algae would seem to provide much-needed habitat and be a benefit to the environment. However, bacterial activity associated with the decay of dying algae uses up oxygen in the water. If the fish and other creatures can escape, they will. But some creatures can't escape, and therefore fertilizer nutrients end up killing fish. In addition, the clarity and quality of the water is reduced.

Pesticides Outside

Pesticides can cause a great deal of harm to the environment when used improperly. The poisonous nature of the mixtures that make them effective in the control of unwanted pests can also cause problems in the water. As poisons contaminate the chain of creatures preying on one another in the water, the chances increase that man will eventually consume some of his own pesticides. This is not meant to sound an alarm, but responsible use of pesticides helps protect the smallest living things, and in the long run this will reduce the potential for poisons in the food chain.

Household Chemicals

Improper disposal or excessive use of household chemicals presents many problems. Sewage systems are not designed to treat many of the chemicals we put down the drain, and some chemicals can pass right through the treatment system to the Bay. When using household chemicals, cleaners, polishes and solvents, please check the label for the safest way to dispose of the product; or better yet, use a non-toxic alternative.

Agricultural Practices

Working with farmers, ranchers and other land owners to develop best management practices is an important effort in Bay pollution prevention. Regulations exist for livestock feedlots. Farmers working with agricultural organizations are developing ways to provide food for the world with the least possible impact on the environment.

Summary

These six indirect pollution sources represent a major problem to the Galveston Bay System. If each person is willing to do his part, it will automatically reduce the expense of cleaning up the problem. If the cities and counties do not implement storm water treatment, coupled with restructuring current water runoff systems, the cost will be measured in loss to the environment.

The Galveston Bay National Estuary Program has heard from many people who want to help protect the bay. It can be done, but each person must commit themselves to the effort. It does not require donations and rallies. It does require a limited change in lifestyle for most of us.

We encourage you to go through this book and discover how you, working alone, can help prevent pollution. Of course, we hope you won't be alone in this effort. Many people will not want to change the way they have always done things. But, if we start by eliminating nonpoint

source pollution at its sources on our property, we may be able to avoid a \$15,000,000,000 expense for the treatment.

Intentional Polluters

Not all pollution is inadvertent. Some people show complete disregard for our environment. It doesn't take an environmental engineer to know that dumping chemicals into streams or bayous is not proper disposal. Untreated chemicals can kill thousands of fish and plants as well as damage vital habitat.

If you see people intentionally disregarding our environmental protection laws, report them. In the "Bay Contact Numbers" section of this book are phone numbers of enforcement agencies, with brief discussions of their programs. If the dumping is an ongoing problem, government agencies have a real opportunity to stop the problem. Isolated incidents are difficult to prevent, but you may be one of several who report the same polluter.

INDIVIDUAL

ACTION FOR THE BAY



Lawn Care

The way to protect the Bay is one yard at a time.

Fertilizers

Fertilizers contain nitrogen and phosphorus, two elements which promote the growth of plants in water as well as on land. Improper use of fertilizers by Houston residents can lead to fish kills and create “dead zones” in Galveston Bay. While this may seem unlikely, the truth is that in many bays in the United States, nonpoint source materials like pesticides and fertilizers have been identified as the number one threat to bay systems.

Try the following to reduce the damage caused by fertilizers:

1. Choose a fertilizer which has at least one-fourth of the nitrogen in a slow-release, water insoluble form.
2. Fertilize in the dry months.
3. Use the minimal amount of fertilizer necessary and apply small, frequent applications. For example, apply two pounds of fertilizer five times per year, rather than five pounds of fertilizer two times per year.
4. Choose plants that generally don't require much fertilization, such as those listed in the Native Plants Section on page 18.
5. Do not apply fertilizer within 50 feet of a water body.
6. Avoid applying fertilizer to paved surfaces. If any fertilizer is inadvertently spread on sidewalks or driveways, sweep it off before watering.
7. Apply the fertilizer when the soil is moist and then water it in lightly. The fertilizer will sink into the root zone where it is available to the plants, rather than stay on top of the soil where it can be blown or washed away.

-
8. If the lawn is mowed frequently, leave the grass clippings to decompose on the lawn. Annually, this will provide nutrients equivalent to one or two fertilizer applications.

Pesticides

1. Choose vegetation that is resistant to pests.
2. Weak plants are susceptible to pests. Make sure the blades on your mower are sharp and adjusted to a high setting to reduce the temporary stress to grass caused by mowing.
3. Avoid using pesticides on a "prevention" schedule basis. Learn to identify insects and monitor them, detect pest problems early by inspecting regularly. Small numbers of pests are tolerable and indeed unavoidable. Often natural predators will limit pest populations if you are patient enough to allow them to do so.
4. If the pests are about to become a big problem, use mechanical, biological or cultural controls. For example, some bugs such as aphids and spider mites can be dislodged merely by forcefully spraying them with a stream of water.
5. Use chemical pesticides only as a last resort. Choose least - toxic ones, like insecticidal soaps. If you must use synthetic pesticides, be sure to follow the label directions and use them only on effected areas. Apply them only during the appropriate time of year and on windless days. Store pesticide containers safely and dispose of the empty containers properly.

Pesticides

<i>Product</i>	<i>Alternatives</i>
Fungicides toxic	do not over-water, keep areas clean and dry
Synthetic Products toxic	botanical (naturally derived) pesticides such as pyrethun, rotenone, sabadilla, nicotine
House Plant Insecticide toxic	mixture of bar soap and water or old dishwater—spray on leaves then rinse
Flea Collars and Sprays toxic	herbal collar/ointment (eucalyptus or rosemary) or brewer's yeast in pets' diet
Roach and Ant Killers toxic	<i>for roaches:</i> traps or baking soda and powdered sugar mix; <i>for ants:</i> chili powder to hinder entrance; boiling water on mounds
Rat and Mouse Poison toxic	live traps, remove food supply

Sediments

Sediments from the soil can wash into waterways to create problems for aquatic life. Turbidity (cloudy water caused by suspended particles) reduces the amount of sunlight able to reach the submerged plants. Siltation (the settling out of the particles onto the bottom of the water body) destroys oyster reefs, submerged grass beds, and other bottom-dwelling plants and animals.

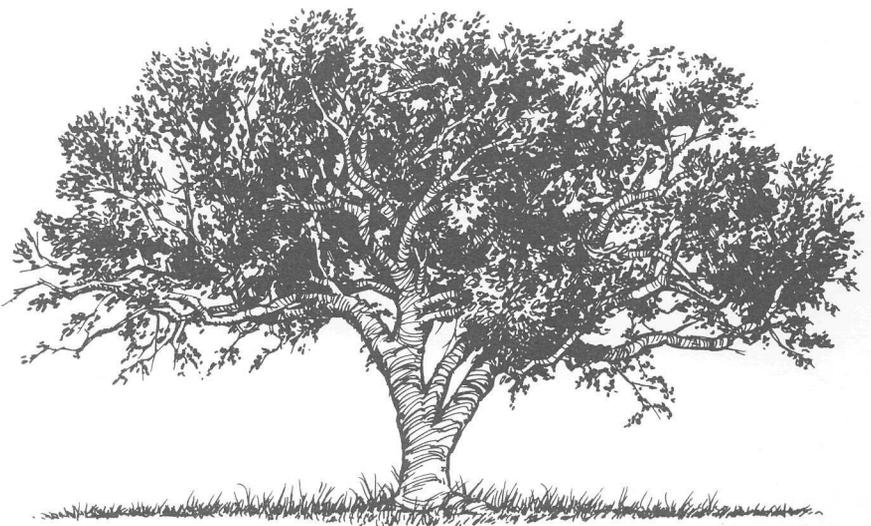
1. Use ground covers to eliminate bare ground. Choose a ground cover which is consistent with your site-specific conditions—light, moisture, salt tolerance, and drainage.

2. Use pine bark, pine needles, or wood chips to mulch the exposed soil in vegetable gardens, flower beds, and high traffic areas.
3. Drip lines under roof eaves and downspouts are areas particularly susceptible to sediment erosion. Place gravel or plant hardy vegetation under roof eaves. Add downspout attachments to slow and spread out the draining water.
4. When landscaping, remodeling, building new structures, or doing any earth moving, cover small mounds of dirt with a tarp so that wind and rain don't carry the sediments to nearby water bodies. Surrounding larger piles of dirt with staked bales of hay or filter cloth fences will minimize erosion.

Native Plants

We have listed below several descriptions of native plants that require little or no fertilizer and grasses that help reduce erosion. These plants provide the basis for a nicely landscaped yard, while requiring fewer water and chemical applications, and less work from you.

This list is not an exhaustive compilation of all the plants native to the Upper Gulf Coast that are attractive for landscaping. For more information, contact your local Agricultural Extension Agent listed in the Helpful Numbers section of this handbook, or your local plant nursery for help.



Live Oak (Quercus virginiana)

Large Trees

Texas Palm (*Sabal texana*)

Slow growth reaches twenty to forty eight feet in height.

Eastern Red Cedar (*Juniperus virginiana*)

Evergreen to fifty feet. Tolerant of most soils. Berries are relished by various local species of birds. Sometimes used as shelter-belt planting.

Live Oak (*Quercus virginiana*)

Evergreen to sixty feet. Very broad, spreading crown. Tolerant of salt spray.

Osage Orange (*Maclura pomifera*)

Deciduous tree to sixty feet, with stout thorns.



Texas Palm (Sabal texana)

Small Trees and Shrubs

Hercules Club (*Zanthoxylum clava-hercules*)

Small tree to thirty feet. Broad rounded crown and spines and trunk and branches. This tree's fruit attracts birds.

Texas Mountain Laurel (*Sophora secundiflore*)

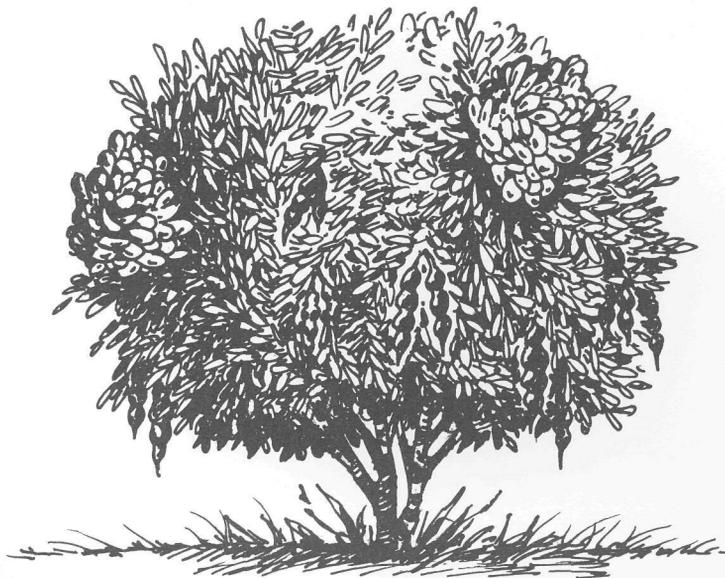
Evergreen shrub or small tree to twenty-five feet. Large violet flower in drooping clusters. Prefers limestone soils.

Yaupon Holly (*Ilex vomitoria*)

Evergreen small tree to twenty feet. Tolerant of shade and sun and a wide variety of soils. Berries are highly desirable as wildlife foods.

Bumelia (*Bumelia lanuginosa*)

Shrub or irregularly shaped tree to sixty feet with stiff, spiny branches. Produces black shiny berries which are very attractive to birds.



Texas Mountain Laurel (Sophora secundiflore)

Buckthorn (*Rhamnus caroliniana*)

Deciduous, graceful tree than can reach thirty feet, but usually is much smaller. Red fruit turning black is good food for wildlife. Prefers moderately well-drained soil and partial shade.

Mexican Buckeye (*Ungnadia speciosa*)

Deciduous small tree to twenty-five feet. Fragrant orchid-colored flowers attract humming birds. Tolerates sun to partial shade. Prefers limestone soils, but is also tolerant of other conditions.

Carolina Wolfberry (*Lycium carolinianum*)

Woody shrub with vine-like trailing branches several feet long. Bell-shaped lavender flowers with fleshy red berries. Common in salt marsh areas. Blooms nearly every month of the year.



Yaupon Holly (Ilex vomitoria)

Flowers

Indian Blanket (*Gaillardia spp.*)

Long-flowering annual or short-lived perennial to two feet. Red and yellow bi-colored flowers. Grows well in full sun and well-drained soils.

Sea Lavender (*Limonium nashii*)

Perennial that grows to two feet. Good in coastal areas.

Salt Marsh Mallow (*Kosteletzkya virginica*)

Shrub-like perennial that grows to six feet. Large showy pink flowers. Best adapted for fresh and saline marsh areas.

Sea Ox-Eye Daisy (*Borrichia frutescens*)

Evergreen shrub-like sunflower to three feet. Tolerant of salt spray. This plant colonizes for added foliage.

Catchfly Gentian (*Eustoma exaltatum*)

Annuals twenty to thirty inches in height. Lavender, cup shaped flowers. Prefers sandy cheniers and damp depressions for growing.

Seaside Goldenrod (*Solidago sempervirens*)

A perennial that grows to six feet. Best suited for salt or fresh water marshes. The dried flower heads are a good source of food for wintering sparrows and finches.



Sea Ox-Eye Daisy (Borrichia frutescens)

Grasses

These grasses are used for erosion prevention and provide excellent habitat

Switchgrass (*Panicum virgatum*)

Stout, perennial, cool-season bunch grass that grows between two and six feet tall.

Gulf Cordgrass (*Spartina spartinae*)

Stout perennial warm-season bunch grass that grows to twelve inches. Particularly well suited for areas that are occasionally submerged.

Smooth Cordgrass (*Spartina alterniflora*)

Strong perennial that grows three to six feet in height. Grows in standing tidal water or saturated muddy soils.



*Sugar Cane Plumegrass (*Erianthus giganteus*)*

Marshhay Cordgrass (*Spartina patens*)

Warm seasonal perennial. Grows between one and three feet.

Sugar Cane Plumegrass (*Erianthus giganteus*)

Stout perennial that reaches a height between three feet and nine feet tall. Grows well with partial shade.

Sea Oats (*Uniola panniculata*)

Warm season perennial between three and six feet tall.

White-top Sedge (*Dichromena colorata*)

White colored leaves resemble a lily. Attractive small clump-forming perennial. Prefers to grow at water's edge. Tolerant of many soils.

Waterfront Property

If you own waterfront property, it is important to consider the following:

1. Protect the natural slope and shoreline vegetation, especially native shore grasses like cordgrass. This is less costly and in some areas more effective than bulkheading.
2. Revegetate areas with native plants.
3. Maintain a gradually sloped, vegetated shoreline when possible, which offers not only an effective defense against erosion but also a rich zone in which plants and animals thrive.
4. Native plants along the shoreline are stabilizers. Their roots, leaves and stems trap and hold sediment, as well as biologically filter out pollutants carried in runoff.
5. Shore plants also shelter and feed all life stages of birds and other animals.

Household Products and Wastes

You can help protect the Bay by using and disposing of household wastes responsibly.

Hazardous Household Products

1. When using household chemicals, cleaners, polishes and solvents, please check the label for the safest way to dispose of the product; or better yet, use a non-toxic alternative when possible.
2. Alternative household products can help protect the environment and still keep your house clean. Listed below are several types of household products and their hazardous properties. Corresponding alternatives are also listed.

Paints

<i>Products</i>	<i>Alternatives</i>
Enamel and Oil Based Paints flammable and toxic	latex or water based paint
Latex or Water Based Paints toxic	limestone-based whitewash casein-based paints
Stains/Finishes flammable and toxic	latex paint or natural earth pigment finishes

Cleaning Products

Products

Alternatives

Oven Cleaners
Corrosive and Toxic

baking soda, water,
and steel wool pads

Toilet Cleaners
corrosive, toxic, irritant

toilet brush and baking soda:
mild detergent

Disinfectants
corrosive and toxic

1/4 to 1/2 cup borax in one
gallon hot water

Drain Cleaner
corrosive and toxic

plunger or snake; flush with
boiling water, 1/4 cup baking
soda and 2 ounces vinegar

Ammonia and All Purpose
Cleaners
corrosive, toxic, irritant

for surfaces: vinegar, salt and
water mix;

for bathroom: baking soda and
water

also: 1/2 cup borax, 1/2 teaspoon liquid
soap, 2 teaspoons TSP (a mineral avail-
able in hardware stores) in two gallons
of water (removes wax buildup as
well)

Rug and Upholstery
Cleaners
corrosive and toxic

sprinkle baking soda on rug,
then vacuum

Floor and Furniture Polish
flammable and toxic

one part lemon juice and two parts
olive or vegetable oil

Laundry Bleach
corrosive and toxic

1/2 cup white vinegar, baking
soda or borax

Mothballs
toxic

cedar chips, newspapers, lavender
flowers

Metal Polishes
toxic

for brass and copper: lemon
and salt or lemon and baking soda;

for chrome: apple cider vinegar

for silver: paste of calcium carbonate
(a powder available at drug stores) and
olive oil - allow to dry before polishing
with a soft, white cloth

General Storage Directions for Household Hazardous Products:

- Keep products in their original containers with original labels
- Store in a cool, dry place
- Keep products out of reach of children and pets
- Regularly check containers, and if you find one leaking, place the leaky container inside another container and label accordingly
- Store incompatible chemical products separately
- Secure lids tightly

HOUSEHOLD HAZARDOUS WASTE CHART

▼ products that can safely be poured down your drain (dilute with plenty of water)

■ materials that can be safely dumped only in a sanitary landfill

● hazardous wastes that should be retained for safe disposal by a licensed hazardous wastes contractor or for collection day

▲ recyclable materials

Type of Waste	▼	■	●	▲	Type of Waste	▼	■	●	▲
KITCHEN					KITCHEN				
Aerosol cans (empty)		■			Floor care products			●	
Aluminum cleaners	▼				Furniture polish			●	
Ammonia based cleaners	▼				Metal polish with solvent			●	
Bug sprays			●		Window cleaner	▼			
Drain cleaners	▼				Oven cleaner (lye base)		■		
BATHROOM					BATHROOM				
Alcohol based lotions (aftershave, perfumes, etc.)	▼				Hair relaxers	▼			
Bathroom cleaners	▼				Medicine (expired)	▼			
Depilatories	▼				Nail polish (solidified)		■		
Disinfectants	▼				Toilet bowl cleaner	▼			
Permanent Lotions	▼				Tub and tile cleaners	▼			
GARAGE					GARAGE				
Antifreeze	▼				Fuel oil			●	▲
Automatic transmission fluid			●		Gasoline			●	▲
Auto body repair products				▲	Kerosene			●	▲
Battery acid (or battery)			●	▲	Metal polish with solvent			●	
Brake fluid			●		Motor oil			●	▲
Car wax with solvent			●		Other oils			●	
Diesel fuel			●	▲	Windshield washer solution	▼			
WORKSHOP					WORKSHOP				
Paint brush cleaner with solvent			●	▲	Paint thinner			●	▲
Paint brush cleaner with TSP	▼				Paint stripper			●	
Aerosol cans (empty)		■			Paint stripper (lye base)	▼			
Glue (solvent based)			●		Primer			●	
Glue (water based)	▼				Rust remover (with phosphoric acid)	▼			
Paint-latex		■			Turpentine			●	▲
Paint-oil based			●		Varnish			●	
Paint-auto			●		Wood preservative			●	
Paint-model			●						
GARDEN					GARDEN				
Fertilizer		■			Insecticide			●	
Fungicide			●		Rat poison			●	
Herbicide			●		Weed killer			●	
MISC.					MISC.				
Ammunition			●		Moth balls			●	
Artists' paints, mediums			●		Photographic chemicals (unmixed)			●	
Fiberglass epoxy			●		Photographic chemicals (mixed and properly diluted)	▼			
Gun cleaning solvents			●	▲	Shoe polish		■		
Lighter fluid			●		Swimming pool acid			●	
Batteries			●						

Septic Tanks

Septic tanks and drainage fields are still in use in many areas. When functioning properly, septic tanks biologically treat wastewater from sinks, toilets, washing machines and dishwashers – and recycle it to the groundwater. When a septic system is not working correctly it can pollute nearby water bodies with bacteria and nutrients.

What you can do:

1. Design the system correctly. Follow the written guidelines from your county, concerning lot size, system capacity, and soil type limitations. If your land is waterfront property, your septic tank design can have a big effect on the nearby water body.
2. Know the location and components of your septic system. Use the access manhole to inspect the septic tank annually for accumulation of sludge and surface scum. If the bottom of the surface scum is within three inches of the tank's outlet pipe, have the septic tank pumped and properly cleaned. Generally, have the sludge pumped every three to five years.
3. Don't use septic tank cleaning compounds. They may reduce the tank's efficiency and damage the drainage field soil.
4. Kitchen garbage disposals unnecessarily burden the septic tank system. Put kitchen organic material in compost piles or in curbside trash cans to be taken to sanitary landfills. If you do use garbage disposal, have the septic tank cleaned every two years.
5. Don't direct roof drains, foundation drains or other drainage into septic tank or absorption areas.
6. Don't water the vegetation in the immediate vicinity of the absorption field. These areas already receive all the water they need.
7. Use water reducing devices, such as flow-restricting shower heads and toilet tank inserts to minimize water flow to the septic tank.
8. Don't use toilets as trash cans. Dispose of household chemicals, plastics, etc., appropriately.

Automobile Care

The automobiles owned and driven by the 3.5 million people in the Houston/Galveston area contaminate the bay with oil, battery acid, gasoline, antifreeze, transmission and brake fluids. Degreasers, rust preventatives, radiator flushers, cleaning and waxing compounds are rubbed, buffed, flushed or applied sometime during the life of most of these cars. Each of these automotive products contain toxic chemicals which should not find their way into our waterways.

To help protect the Bay:

1. Maintain your car. Note any leaks of fluid. Repair oil, transmission fluid, and brake fluid leaks immediately for your safety, as well as the life of aquatic plants and animals.
2. If you change your own oil or antifreeze, never dump these toxic liquids into storm drains, ditches, or onto the soil.
3. When washing your car use a mild biodegradable, low phosphate soap. Use a bucket of water or a hose with a shutoff nozzle, rather than a constant stream of water.
4. Buy only the minimum amount of automotive products you need to maintain your car. Store and dispose of these empty containers properly.

Boat Care

Boating is very popular around Galveston Bay. This is highlighted by the fact that the Clear Lake-Galveston Bay Region ranks as the third most populated pleasure boat region in the U.S. The Bay system is home to forty marinas and 9,000 wet slips, and thousands of boats are placed in the water through public boat ramps. Boaters' use and care of their craft have a large impact on the health of the Bay system.

1. When fueling boats, do not spill fuel or over fill the tank. When filled sufficiently, tighten the fuel cap and wipe away any dripping fuel.
2. Discard all trash appropriately. Never toss any litter overboard, especially plastics. Monofilament fishing line and six-pack rings are particularly harmful to aquatic and bird life.
3. Maintain boat engine to avoid any oil leaks. When changing the engine oil, bring the used oil to a marina that recycles oil. Never dump it into a waterway, storm drain or ditch.
4. Rinse and scrub your boat with a brush, rather than with soap-when soap is necessary, use phosphate-free soap.
5. When removing the paint from boat hulls, catch the scrapings in a dry cloth, or sweep and throw them away in the trash. Bottom paints contain copper or tin which are extremely toxic to aquatic life.
6. Always avoid cutting through seagrass beds with boat propellers.
7. Leave at least 12 inches of clearance between your boat propeller and the bay bottom. Churning up sediments not only causes the water to become cloudy, but also damages communities of bottom-dwelling animals and plants.

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8. Use onshore sanitary facilities whenever possible. If you are within three miles of shore the U.S. Coast Guard requires sanitizing gear or an onboard holding tank. Empty the holding tank at a designated pump-out station.

CONTACT NUMBERS

County Health Departments

Brazoria County, Environmental Health Department:
409/849-5711, ext. 1600

Chambers County, Department of Environmental Health:
409/267-6677

Galveston County Sanitation Department:
409/765-2551

Harris County Engineers Department, (for septic systems)
713/221-5374

**Harris County Health Department,
Environmental Engineering Division,
(drinking water quality and utility service)**
713/620-6860

Liberty County Health Department, County Engineer:
409/336-8981

Your County Health Department can answer questions about your residential Septic System, and offer information about county services.

Harris County Flood Control District

Harris County Flood Control District
713/684-4000

The Flood Control District will address concerns about ditches and bayous. In some cases they will investigate if there is a concern about erosion of property, cleaning and mowing of ditches, and flooding of bayous adjacent to property.

Texas Agricultural Extension Service

Brazoria County: 409/849-5708
Chambers County: 409/267-3185
Galveston County: 409/945-0642
Harris County: 713/855-5600
Liberty County: 409/336-8071

Your local Extension Agent has a wealth of information about lawn and home care and can answer many of the questions a homeowner

in the Galveston Bay area might have. Don't hesitate to give your agent a call.

Texas Department of Health

State office 512/458-7111

The Texas Department of Health is responsible for protecting the public in all health matters. This includes bay contact areas and health issues related to consumption of seafood. If you have a question about a health related issue contact TDH.

Texas General Land Office

State office 512/475-1575

The General Land Office is responsible for investigation of all coastal oil spills. To report on oil spills in the Bay or Gulf, contact the General Land Office.

Texas Parks and Wildlife Department

OPERATION GAME THIEF 1-800-792-GAME

is the 24 hour response to report game or fishing violations.

**Houston 713/931-6471 or 713/645-0212
La Porte 713/471-8677
Seabrook 713/474-2811**

To contact local Parks and Wildlife Department Office during regular office hours.

1-800-792-1112

The 24-hour state information line for the TPWD.

Texas Water Commission

TWC Houston/Galveston office 713/457-5191

For all water quality matters contact this office Monday through Friday between the hours of 8 a.m. and 5 p.m.

**TWC 24 Hour Emergency Spill Response Line
512/463-7727**

Report any type of chemical spill, or hazardous materials spills whether in water or on land. (YOU SHOULD ALSO CONTACT YOUR

Getting Involved

If you are interested in being a part of the Galveston Bay National Estuary Program, we welcome your input and your participation. Please contact the Program Office at:

713/332-9937

or write to us at:

Galveston Bay National Estuary Program
Bay Plaza One
711 Bay Area Boulevard
Suite 210
Webster, Texas 77598

Also, visit the Information Center at the Texas A&M University Pelican Island Campus in Galveston. The Information Center houses a variety of publications, photographs and videos about the Galveston Bay System.

Galveston Bay Information Center
Jack K. Williams Library
TAMUG
P.O. Box 1675
Galveston, Texas 77553

409/740-4567

PUBLIC OPINION SURVEY

Please complete and return this survey form to:

Galveston Bay National Estuary Program
Bay Plaza One
711 Bay Area Boulevard
Suite 210
Webster, Texas 77598

Name: _____

Town: _____

I generally use the bay for:

- sport fishing boating my job
 bird watching picnicking general recreation
 not at all other (please identify)

What I like about this handbook: _____

What I don't like about this handbook: _____

You can improve it by: _____

Overall I:

- liked this User's guide didn't like this User's guide
 believe this is useful think it should not be done
again